SECTION 430

LANDSCAPING AND PLANTING

430.1 DESCRIPTION:

This section shall govern the preparation and planting of landscape areas required in the plans, specifications, or special provisions. Landscaping materials will be in accordance with Section 795.

430.2 GENERAL:

The Arizona Pollution Discharge Elimination System (AZPES) may be applicable to the work of this section. Refer to the AZPDES Construction General Permit (CGP) requirements.

Comply with Blue Stakes Arizona 811 requirements as related to the staking of underground utilities. Determine the location of underground utilities through Blue Stakes Arizona 811 or other approved methods and perform work in a manner that will avoid possible damage. Maintain stakes by others until removal is mutually agreed upon by the affected parties. Hand excavation as required when working in proximity to any underground utilities. At no additional cost to the project, repair any damages to staked utilities.

Prior to all work, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where the landscaping installation may commence. Verify that planting may be completed in accordance with the original design and the referenced standards.

The landscaping work shall be performed by a single firm specializing in landscape installation and maintenance, with the appropriate State of Arizona contractor's license in force, and a minimum of two years of experience in the type of work described in this section. Assign a least one person to serve as lead installer. This person shall be thoroughly familiar with the materials, equipment, and techniques of the planting operation, and shall direct the work described in this specification.

Submit instructions recommending procedures to be established by Owner for full care, vigorous growth, and maintenance of each category of plant specified, with specific recommendations for the type of care, insect, and disease prevention for each quarter of the year. Include color pictures of each type of plant used in the project (trees, shrubs, saguaro, and cacti), showing full plant form along with both the botanical and common names. Instructions shall be provided on when to remove tree stakes and guys, as applicable. Submit instructions in digital format (e.g., pdf) or hardcopy as requested by the Engineer, with photos as specified. Provide Owner with two copies. Instructions shall also include a suggested monthly watering schedule for establishment and maintenance of each planting area shown on the plans. The watering schedule shall account for seasonal temperature change and its effect on each type of planting. Submit instructions prior to the expiration of landscape establishment period.

All herbicide/pesticide applicators shall be properly licensed for application of non-restricted use chemicals with an A-20 license or an A-21 license with Pesticide Endorsement from the State Registrar of Contractors and Structural Pest Control Commission. Furnish a copy of the applicator's Registrar of Contractors license, which shall list the names of those employees, approved as applicators by the Registrar of Contractors. Application of non-restricted use pesticides shall not take place until the Engineer receives a copy of the application.

Prior to any grading the areas shall be cleared and grubbed in accordance with Section 201, Clearing and Grubbing. The Contractor may not work outside the established construction limits without approval of the Engineer. Trees, individual shrubs and shrub masses, native grasses, topography, and rock outcrops that occur outside of the limit of construction which are damaged or destroyed during the clearing and grubbing or subsequently during the construction of the improvements shall be replaced with equal-size, like-kind materials at the sole discretion of the Engineer.
Unless indicated otherwise in the contract documents, water costs are the Contractor's responsibility until Final Acceptance or completion of the Plant Establishment Permit, whichever is longer.

Landscape or planting areas shall not be cultivated when they are so wet as to cause excessive compaction or the formation of large clods or so dry as to cause excessive dust.

Unless otherwise provided, landscaping, irrigation systems, and other improvements shall be constructed after rough grading has been completed and prior to finish grading.

Finish grade for lawn and granite areas shall not vary more than 1 inch from the specified grade and cross-section and shall be a smooth uniform surface, free of any abrupt grade changes or depressions. Unless otherwise specified, finish grade below adjacent paving, curbs, or headers shall be 1 inch for lawn, native seed, and granite areas. For native seed areas, a vertical tolerance of one inch (1") above and one inch (1") below the grades and cross sections shown on the plans will apply to the construction limits provided that drainage is not adversely affected or pooling areas are created.

Unless otherwise specified, in-place soil will be prepared and conditioned for utilization as topsoil. If imported topsoil is specified or has to be used, the existing soil, before subgrade, shall be scarified to a depth of 6 inches prior to placing the topsoil and the thickness of the topsoil layer shall be at least 6 inches.

All landscape and planting areas, except those intended for lawns, shall be treated with a broad-spectrum pre-emergent herbicide per Section 795.

Do not make substitutions. If specified plant material is not obtainable, submit proof of non-availability from three (3) source, together with a proposal for use of equivalent material, similar in appearance, ultimate height, shape, habit of growth, and general soil requirements.

Before delivery of the following materials, a letter of compliance shall be submitted, certifying that the materials meet the requirement for legal transportation in accordance with State and Local government agricultural laws, and are true to their specified analyses. Certify the following:

Nursery propagated plants
Cacti, succulents, and native plants
Soil Amendments and conditioners
Lawn seeds, stolons, and sod
Native seed mixes

The Engineer reserves the right to take and analyze samples of materials for conformity to specifications at any time. Contractor shall furnish samples upon request. Rejected materials shall be immediately removed from the site at the Contractor's expense. The Contractor shall pay cost of removing materials not meeting specifications.

430.2.1 Tree and Shrub Protection During Construction:

The Contractor is responsible for maintaining the health of all trees that are to remain on-site during construction. Contractor shall establish a Tree Protection Zone (TPZ) around the dripline (canopy perimeter) of the tree(s) or at least a minimum of 1-foot radius for each 1 inch of trunk diameter measured at 4 to5 feet above pre-construction grades to protect the Critical Root Zone (CRZ) of the trees designated to remain. The TPZ shall consist of a barrier constructed of either 6-foot chain link fence panels or 4-foot vinyl orange construction fencing. Support stakes (metal or wood) for the fence are to be at 6-foot spacing and sufficiently secured to remain in place through the construction period. The protection zone shall have signs attached to the fending material indicating the presence of the TPZ. The TPZ and fencing shall be established prior to any construction activities. Fencing is to remain during the construction activities.

Where conditions do not permit complete protection for the CRZ, on a case-by-case basis, the Contractor and the Engineer shall agree on the proper protection measures to be used on the project.

Except for handwork to achieve the objectives of the contract documents, no activity within the TPZ is permitted, including but not limited to: excavation; grading; drainage; parking and/or equipment storage; material storage; disposal of oil, gasoline, concrete washout, or chemicals; and debris storage. Removal or relocation of fencing for

temporary access inside the TPZ must be replaced immediately upon completion of the activity or at the end of the day, whichever activity occurs sooner. Temporary access into the TPZ must be approved in advance by the Engineer.

The roots of all trees to remain on-site during the construction should not be damaged or cut. When root cutting is unavoidable, the Contractor and Engineer shall review the extent needed and determine a course of action. A clean sharp cut shall be made to avoid shredding or smashing of roots. Any exposed roots shall be covered immediately with soil or burlap and kept moist to help prevent dehydration. Unapproved horticultural damage and repairs caused by the Contractor shall be mitigated at no additional cost to the project.

430.2.1.1 Pruning of Protected Trees and Shrubs. For trees, determine the proposed branches to be trimmed and the procedures for trimming branches on the plants to remain in place so that an 8’ clear height over hardscapes areas (slabs, paths, trails, pavement, etc.) and at least 3-4’ of horizontal and vertical clearances over shade structures is achieved. The Contractor shall flag or tag all branches >2” in diameter to be removed to achieve the above criteria for approval by the Engineer.

Remove undesirable branches not directly affected by the construction to establish a vegetation canopy density and plant shape that is in equilibrium with the remnant root function and capacity of the plants after this phase of the work is completed and to result in tree canopies and shrubbery shapes that are generally symmetrical and visually consistent with the characteristics of the same plants in the surrounding landscape. It is recognized that the work may not result in a fully symmetrical shape, however, by more closely balancing the foliage mass with the available roots it is expected that the work of this item will provide the greatest opportunity for the long-term health and survival of the existing plants. All trimming and wound care work shall comply with ANSI A300 Standards for Tree Care Operations and ANSI Z-133.1 Safety Standard and in accordance with procedures standard to the horticultural industry, as approved by the Engineer.

430.3 PLANT SALVAGE

Salvaging and replanting of trees, cacti, and shrubs as indicated on the plans shall be completed by a firm specializing in plant salvage and replanting who shall use standard care and practices of the industry. The contractor performing the work shall be in good standing with the Registrar of Contractors.

Salvaging and storing native plants affected by the improvements in a nursery is not mandatory requirement on this project. The contractor may elect to transplant some or all of the plant materials using a 'move once' method, where the salvaged materials are replanted as a single operation after being excavated from their original in-situ location. If the contractor elects to use this method for all or part of the salvage work, the specific plants to be handled this way shall be addressed in the Transplanting Plan described below. To facilitate tracking the salvaged plants, all plants shall be inventoried and given a salvage number by the Contractor, then tagged in the field with a plastic or aluminum tag that will survive through the project duration. Plant numbers shown on the plans that correspond to individual plants shall remain with those plants for the life of the project. The Contractor shall photograph of each salvaged tree and saguaro; a scalable object shall be visible in the image so that the actual height, width, and character of the plant can be assessed if it must be replaced later in the project. The photographs must be neatly organized and contained in the Transplanting Plan.

Within 10 days of the Notice to Proceed, the contractor shall submit a Transplanting Plan for the review and approval of the Engineer prior to the beginning any groundbreaking activities. The Transplanting Plan shall contain, but not be limited to, the following information.

1. Proposed methods for coordinating the salvage and replanting activities (as applicable) with the anticipated sequencing of construction, including a schedule of operations;
2. List of mechanical and hand equipment and materials to be used to accomplish all salvage and replanting work, specifically identify the steps for excavating, pruning, lifting, hauling, placing, fertilizing, and bracing the plant material;
3. The location and layout of the proposed nursery/storage yard and watering system.
4. The Plan shall identify the proposed storage yard activities such as the water source and fertilizing and

maintenance activities during the storage period.

Subsequent to the approval of the Transplanting Plan, the contractor shall submit three copies of a list of all materials and equipment proposed for incorporation into the salvage and replanting work. The contractor shall have the materials correctly marked on each copy of the list. The list shall show the manufacturer's names, model numbers, sizes, capacity, specifications, instructions, design data and/or drawings to determine whether or not each piece of material or equipment is acceptable. No material may be ordered, and work shall not begin until the Engineer has approved all equipment.

The Transplanting Plan shall be contained in a three ring binder and shall be typed on 8 1/2" x 11" sheets.

In addition, the Transplanting Plan shall have a separate chapter identified as the 'watering plan'. The watering plan shall include applicable plans, details and documentation to demonstrate how the salvaged plant material will be watered from the initiation of the salvaging activities through the Plant Establishment Period. The Plan shall identify the source of water used on the project; its capability to deliver water in sufficient quantity to meet the project needs; the proposed methods for delivering water from the source to the plants; a layout of the irrigation system to be used in the nursery (if used); and protection of the watering method from damage by animal damage, insects and/or other detrimental conditions. If the water for the project comes from a source other than a potable water line, the Transplanting Plan shall also contain a letter from a certified laboratory that the proposed water source is acceptable for the intended use.

The Transplanting Plan will be reviewed by the Engineer who reserves the right to request further information on the methods proposed by the contractor. Upon written acceptance by the Engineer, the Transplanting Plan shall be modified as agreed upon and included as part of these specifications and shall govern the requirements of those portions of the work therein. Resubmit Transplanting Plan with agreed upon modifications.

Salvaged plants shall be removed, lifted, transported, stored, and replanted in a manner that reduces damage to the trunks, arms, branches, and crown of the plants. Prior to removal, the north faces of saguaro and barrel cacti shall be marked with an acceptable material so that their same solar orientation can be maintained during the replanting. Excavated plant pits shall be backfilled to a minimum of 85% standard Proctor density. The Contractor is also responsible for safety considerations of the public, other contractors, and his/her crew members during the salvage operations. Equipment for this process is to be identified in the Transplanting Plan and approved by Engineer prior to commencement of work.

The Contractor shall demonstrate that the proposed excavation process will provide sufficient root lengths and locate and expose the roots without damage of the plant from the equipment and machinery used for the excavating and transporting of the plants. The methods and/or materials shall not damage and/or mar the surface or internal structure of any salvage plants

All wounds and/or cuts made to the roots shall be treated with powdered sulfur or bactericide on the same day that the cut and/or wound was made.

As applicable, plants shall bear evidence of compliance with the Arizona Native Plant Law.

No plant salvage operations shall begin until the on-site nursery (if used) has been prepared and the Engineer has provided written acceptance.

Salvaged Plant Nursery: If an on-site nursery location has not been designated on the plans; the Contractor shall propose a location in the Transplanting Plan if so desired. The Engineer shall, at his/her sole discretion, approve the nursery site prior to use. If an off-site location is used, the approval of the landowner, environmental clearance, preparation and reclamation of the nursery site is the responsibility of the Contractor. The Contractor shall have completed the construction of the nursery per the Transplanting Plan prior to the excavation of any stock. The nursery shall be gated and fenced with at least a 6 foot high chain link fence; have a lockable gate for which the Engineer will be provided a workable key for the duration of the storage yard existence: ground surface prepared to accept any heeled in plants; graded to prevent ponding and promote positive drainage away from collected stock and to control

run-on that may damage stock and/or transplanting operations; and shall be equipped with a water distribution system as approved. No flammable fuels or explosives are permitted in the yard. The Contractor shall be responsible for security at the nursery site and shall hold harmless the Contracting Agency from potential claims arising from the use of the nursery area, acts of vandalism, or delays resulting from unauthorized theft, vandalism, or removal of materials and equipment from the nursery site. The Contractor shall insure that the plants receive regularly scheduled water and shall modify the schedule in response to climatic conditions. The nursery shall be kept weed free by the Contractor by the use of hand equipment and labor. The use of chemicals or herbicides to combat weeds will not be allowed within a 6-foot radius of any stock.

Each plant salvaged between October 15 and April 15 ("winter dig conditions") that is stored in the nursery shall be protected from the detrimental effects of cool/cold weather. The Contractor shall submit their proposed method for protecting the plants in the Transplanting Plan.

The temporary irrigation system for the nursery shall be capable of meeting the irrigation requirements of plants occupying the nursery. The contractor shall document and record all watering dates and frequencies and submit this information to the Engineer. The temporary irrigation system shall be constructed with materials and methods to prevent damage or impede the intent of the system's operations by rodents, insects and pests of the area. Sprinkler and overhead spray irrigation systems are not acceptable for use in the nursery.

The Engineer will perform visual inspections each month in the presence of the Contractor, unless the Engineer and the Contractor agree to other arrangements in writing. Nursery-stored plants will be reviewed for overall condition including pruning compliance with accepted standards. During the reviews, the contractor must present copies of his/her log including species identification numbers and dates the salvaged plants were delivered to the nursery. Notations will be made as to any unacceptable plants, plants in shock or other pertinent information. After 30 days stabilization in the nursery, or unless the decision is deferred for a longer period by the Engineer, plants may be accepted, rejected or put on hold to see if their condition improves at the sole discretion of the Engineer.

Salvaged plants will be deemed acceptable if they show evidence of good overall health and vigor when reviewed by the Engineer. Salvaged plants that do not display a healthy vigorous appearance shall be deemed unacceptable by the Engineer and replaced with like-kind, like size materials of the same species.

430.4 PREPARING THE SITE FOR LANDSCAPING:

When indicated on the plans and in the special provisions, all non-paved areas, as directed by the Engineer, shall be treated with a short duration pre-emergent to control and kill on-site weeds. Applications of the pre-emergent shall contain a blue or green dye to that the treated areas can be identified. Those areas shall be cleared and grubbed no earlier than two weeks after the last application of pre-emergent or when weed kill has been occurred to the satisfaction of the Engineer. Any area to receive seed mix of which is to remain undisturbed is excluded from this requirement.

Remove trees, shrubs, grasses, improvements, or obstructions that interfere with the completion of the new work. Removal includes digging out stumps and roots to a depth of a minimum of 12 inches below the existing or proposed finished grade, whichever is lower. Fill depressions caused by clearing operations with satisfactory soil at a minimum of 85% standard Proctor density.

Rough grade and remove all deleterious materials. Establish a subgrade elevation, that when covered by the finishing materials as the specified dimensions, produces a finished grade required on the plans and this specification while also facilitating the surface drainage flows as designated on the plans.

Landscape planting area shall not be cultivated when they are so wet as to cause excessive compaction or so dry as to cause excessive dust or the formation of clods.

430.5 TREE, SHRUB, GROUND COVER, AND CACTUS PLANTING:

The species, sizes, the manner in which to be furnished, and the approximate number are as shown in the plant list. The quantities, as listed, are approximate and the Contractor shall furnish and install all plant material necessary to

complete the plantings as shown on the landscape plan. Change order adjustment will be made for unit price proposals, but not for lump sum proposals.

430.5.1 Substitutions: All requests for substitutions must be submitted in writing to the Engineer prior to commencement of work on the project. The Contractor shall not take any further action concerning this request until a written approval or denial is received from the Engineer submission of proof that the specified plant is not reasonably procurable in the local region. Substitutions will resemble the specified plant in appearance, ultimate height, shape, habit of growth, and general soil requirement.

Substitution of a larger size of the same species may be made by the Contractor without written approval. However, the Contracting Agency will not be responsible for any additional costs incurred by the Contractor, either for the additional cost of the plants or for any additional planting costs.

430.5.2 Plant Inspection Prior to Delivery to the Project Site: Prior to delivery of any species to the project site, the Contractor shall make the necessary arrangement with the Engineer for an inspection of the plant material at the offsite location. The Contractor shall notify the Engineer at least 72 hours in advance for inspection of the plant material at the off-site location. Prior to providing the notification, the Contractor shall physically verify that the plant materials meet the size specified. The Contractor will pay for transportation for each trip to nurseries located greater than 30 miles from the project site. Do not prune prior to delivery. Prior to the nursery visit, the contractor shall physically verify that the plant materials meet the size specified and are available for inspection. Any plants found to be unsuitable in growth or condition, or which are not true to name,form, and size shall be replaced with acceptable plants.

430.5.3 Plant Inspection and Protection after Delivery to the Project Site: Subsequent to the delivery of the plants to the site, the Engineer shall retain the option to re-inspect the plant material. Plants that do not meet the requirements herein shall be removed from the site and new material provided until the replacement plants have been accepted. Plants transported to the site shall be planted as soon as possible. During any interim storage period, they shall be watered twice a day in the summer and once a day in the winter months. Any stock, that in the opinion of the Engineer, has deteriorated due to exposure or has been damaged during transporting, shall be removed and replaced at the Contractor's expense.

430.5.4 Plant Location: The Contractor shall stake out the location of planting areas and planting pits prior to any excavation. Subject to the Engineer's approval, minor relocations may be accomplished at this time to avoid unsuitable conditions, such as utilities, rocky areas, poor soil, etc. Prior to planting, a percolation test shall be performed on 1/4 of tree pits (locations determined by the Engineer) and all saguaro planting pits to determine adequate drainage. Fill pit half-full with water. Allow 24 hours to drain. New locations for the plant(s) may be selected by Engineer or supplemental instructions may be issued; the Engineer also reserves the right to direct additional work to achieve proper drainage on a plant-by-plant basis. If major relocations are necessary, the Engineer will provide revised plans.

430.5.5 Ground Cover Areas: The planting beds shall be brought to finish grade before spreading the fertilizer or conditioning material specified. Fertilizing and conditioning material shall be mechanically spread at a uniform rate over the entire bed area. After spreading, this material shall be uniformly cultivated into the upper 6 inches of soil using suitable equipment. The resulting soil shall be in a friable condition suitable for planting.

Ground cover shall be planted in moist soil with the spacing as indicated on the plans. Each plant shall be planted with its proportionate amount of soil so as to minimize root disturbance. After planting, the area shall be raked to restore a smooth finish grade and to provide drainage. Watering will begin immediately.

The Contractor is responsible for maintaining these areas until final acceptance by the Contracting Agency. Maintenance will include protection from trespass or damage, weeding, watering, and removal of all debris. It may be necessary to install a protective fence or barrier around these areas until growth is assured.

430.5.6 Tree and Shrub Planting: Planting holes shall be approximately circular with a diameter between two and three times the size of the plant root ball. The depth shall be equal to the root flare of the plant. The sides of the planting hole shall be scored to prevent glazing. Unless otherwise specified, the excavated native soil shall be used

for back fill. Rock materials greater than 2 inches, dead grass and plant debris, or construction debris shall not comprise backfill material. A conditioned soil mixture, organic material, or soil amendments are only to be added to the backfill if specified in the special provisions and the results of a soil analysis has been provided. The Engineer shall review any proposed soil mixture.

All containers shall be opened and removed, including bottom and sides, in such a manner that the roots of the plant are not damaged. Root balls, including the bottom, shall be inspected, and roots pruned, cut, or shaved as needed to eliminate defects and circling roots ("rootbound" condition). Balled and burlap or wire caged plant wrapping shall be loosened and cut back after the plant is positioned in the hole. It is preferred to shave the outer one to two inches of the root ball using a sharp blade or hand saw to remove all roots on the periphery of root ball. Shaving can be performed after placing in the hole.

Plant trees and shrubs after final grades are established and prior to planting lawns, unless otherwise accepted in the construction schedule by the Engineer. If tree and shrub planting occurs after lawn work, protect lawn areas and properly repair damage to lawns resulting from the tree and shrub installations.

Trees shall be set approximately in the center of the hole with the root flare one to two inches above the anticipated finished grade. Plant shall be set on a non-compacted firm soil, plumb and in the center of the pit. When the plant pit is approximately 2/3 full, water the plant thoroughly, before placing the remainder of the backfill to help eliminate air pockets. Repeat watering again after placing final layer of backfill mix until soil is completely saturated. Plants will not be allowed to be 'dry planted' or stand in planting holes without watering The plant shall be faced to present the best appearance and relationship to adjacent plants or hardscape features.

Place fertilizer tablets approximately 6 inches below grade and evenly spaced around the plant:

For one-gallon container……..1 tablet
For five-gallon container…….2 tablets
For 15-gallon container……...4 tablets
For twenty-four inch box container…….6 tablets
.

The nursery support stake and all ribbons and tags shall be removed. Stake all trees per the plans and details. Avoid rigid restraint of tree and allow for some trunk movement.

Any pruning following planting shall be limited to removal of damaged or broken branches and shall be performed by an ASI Certified Arborist as approved by the Engineer.

430.4.7 Cactus: Saguaro, ocotillo, and other small cacti shall be installed per the plans. Maintain the proper solar orientation of the plants as part of the installation.

430.5.8 Root Barriers: Root barriers used for hardscape and underground utility infrastructure protection shall be installed as shown on the plans and described in this specification or the special provision. At a minimum, a vertical depth of two feet is required with the top edge of the barrier material at finished grade. The horizontal position, location, and installation of the barrier shall be as shown on the plans and as described in the special provisions.

430.6 LAWN AREAS:

430.6.1 Preparation of In-Place Soil: After clearing and grubbing has been completed, the existing surface shall be scarified and cultivated to a minimum depth of 6 inches; then brought to finish grade. During the operation, all debris, including all stones and debris on the surface over ¾ inch in any dimensions, shall be removed and disposed of offsite.

After clearing, grubbing, and initial cultivation has been completed, chemical fertilizer, 16-20-0 composition, shall be

mechanically spread over the entire area at an average rate of 6.25 pounds per 1000 square feet. After spreading, the fertilizer shall be cultivated into the top six inches of soil using suitable equipment. The resulting soil shall be in a friable condition, suitable for planting. Upon completion of the soil preparation, the Contractor shall provide the Engineer an updated soil analysis report to confirm appropriate composition (Soil pH, Salinity, micro nutrients, etc.) has been met. The Engineer shall inspect and approve these areas prior to seeding.

Roll the lawn surface to obtain the desired uniform compaction and to remove ridges or high spots. To determine the proper level of compaction, the Engineer shall be able to push a hand probe to a depth of 4 inches at any location where lawn is to be established.

430.6.2 Seeding: If a Bermuda summer lawn has not been established during its normal planting season, April through September, then Perennial Rye Grass (Lolium perenne) seed shall be planted.

Bermuda seed shall be planted only at time when daytime atmospheric temperatures are consistently above 90 degrees F. and the nighttime temperatures are consistently above 60 degrees F. If lawn establishment cannot be completed during the contract period, then Perennial Ry Grass seed will be planted when required by the Engineer at no additional cost to the project.

Sow seed using a spreader or seeding machine. Do not seed when the wind velocity exceeds 5 miles per hour. Distribute seed evenly over the entire area by sowing equal quantities in tow (2) perpendicular directions. The rate of seeding shall be 3 1/2 pounds of Midiron Bermuda seed or 15 pounds of Perennial Rye seed per 1,000 square feet.

After seeding has been completed, the entire area shall be raked with a turf or flail rake for leveling and to incorporate the seed into the top 1/8 inch of soil. Immediately after raking, the area shall be watered with a mist type spray until the soil is wet to a depth of 2 inches.

The Contractor shall provide the necessary safeguards to protect the planted areas from damage by erosion or trespass. Any damaged areas or any areas, greater than 6 inches in diameter, which fail to show a good stand shall be repaired and replanted until an acceptable stand of grass is obtained.

430.6.3 Sod. Sod shall be per Section 795 . time the delivery of sod so that it will be placed within 24 hours after stripping at the sod farm. The Contractor shall flag the area to be sodded and coordinate the subgrade preparation with the general excavation activities to provide for the preparation of the In-Place Soil or other seed bed preparation specified in the special provisions. onto which the sod will be placed. Sod thickness shall be considered when adjacent to hardscape elements. Prepare all edge conditions to accommodate sod thickness and to ensure the specified vertical relationship between the finished grade and nearby walks, curbs, fence lines, turf edges, etc.

Place sod strips parallel to each other with staggering joints, lay perpendicular-to-slope when possible. Install with tight-fitting joints. Stagger sod strips to offset joints in adjacent courses. Work for boards to avoid damage to subgrade or installed sod. Sod edges and joints shall be leveled with an approved soils mix. Roll in two (2) directions after an initial watering to create uniform grade and eliminate any irregularities. Use care not to over-irrigate and create saturated conditions. After rolling, water thoroughly to penetrate subsoil at least 4 inches. Repeat watering at regular intervals to keep sod moist.

Finish grade between the newly planted sod where it abuts existing turf shall be smooth, level, and without any irregularities. The line of transition between new sod and existing lawn shall be straight and consistent, avoiding any visible horizontal or vertical anomalies

430.6.4 Maintenance: The Contractor shall be responsible for maintenance of the lawn areas until they are accepted by the Contracting Agency or until the completion of the Plant Establishment Period, whichever occurs later. This shall include watering, mowing, weeding and removal of all debris. Begin maintenance of lawn areas immediately after each area is planted. Mow turf as soon as there is enough top growth to cut with the mower set at the height specified on the plans or the special provisions. If no height is specified, the mow height shall be 1½ to 2 inches. Remove no more than 40% of grass leaf growth in initial or subsequent mowings. Do not delay mowing until the grass blades bend over and become matted. Do not mow when the grass is wet. Time initial mowing to maintain specified

grass height. Prior to final acceptance, a top dressing fertilizer shall be applied to lawn areas during the growing season at a rate of (1) pound of actual nitrogen per 1,000 square feet of lawn area. This top dress fertilizer application shall be applied once prior to the final acceptance.

430.7 NATIVE SEED:

Native seeding shall consist of furnishing all materials, preparing the soil, applying equal distribution of seed, and establishing the seeded areas.

Native seeding shall be accomplished in two stages. The first stage shall consist of soil preparation, furnishing and applying the seed; and furnishing and applying the wood fiber mulch The second stage shall consist of a 45-calendar day maintenance and stabilization period, during which time the Contractor shall be responsible for maintaining and stabilizing the seeded and mulched areas and restoring damaged or eroded areas until conclusion of the establishment period and acceptance by the Engineer.

Appropriate materials documentation shall be submitted to the Engineer prior to the start of the scheduled native seeding activity. No materials shall be delivered to the site until approval has been received.

The species, variety, and/or strain of seed shall be specified as indicated in the Native Seed Mix table in this specification. The Contractor shall submit written documentation from the seed supplier, on their letterhead, confirming that the source(s) for the contract-specified seed has been secured, per the seed mix design, and that all seeds have been stored under dry conditions, out of direct sunlight, and at temperatures between 35-120 degrees Fahrenheit.

Seed substitution should be a written request to the Engineer for review and approval. Any proposed substitution seed shall be of equal value and match (or closely mimic), the original mature plant characteristics, such as color, growth habit, and known to grown in the project area.

Application rates of seed are for Pure Live Seed (PLS). PLS is determined by multiplying the sum of the percent germination of seeds, including hard or dormant seeds, by the percent purity. No substitution of seed mix will be allowed unless Contractor shows documentation from at least three (3) seed suppliers that the seed is not available in time for the seeding effort, per project construction schedule.

Native Seed Mix:

Botanical Name	Common Name	PLS Rate (Pounds Per Acre)
Ambrosia deltoidei	Triangle-leaf Bursage	1.0
Aristida purpurea	Purple Three-awn	2.0
Baileya multiradiata	Desert Marigold	1.5
Bouteloua aristidoides	Needle Grama	0.5
Encelia farinose	Brittlebush	1.5
Eschscholtzia Mexicana	Mexican Poppy	1.0
Lesquerella gordonii	Gordon's Bladderpod	0.75
Phacelia crenulate	Arizona Desert Bluebells	1.0
Plantago ovata	Desert Indian Wheat	1.0
Senna covesii	Desert Senna	1.5
Sphaeralcea ambigua	Desert Globemallow	1.0
Sporobolus cryptandrus	Sand Dropseed	0.10

Seed Bed Preparation: The Contractor shall stake out all areas to be seeded and obtain Engineer's approval prior to

beginning work.

All seeded areas shall be tilled to an average 3-4" depth by disc harrow, chiseling tool or with other approved equipment. Tillage shall be done along the contours of the slope, and the ground shall be ripped in two perpendicular directions unless relief from this requirement is authorized by the Engineer. No work shall be done when the moisture content of the soil is unfavorable or the ground is otherwise in a condition not conducive to tillage. Slopes steeper than 2:1 are not required to be tilled or ripped. All competitive vegetation shall be uprooted during the tillage operation. Slopes of 6:1 or greater shall be left with a roughened surface to aid in water absorption. Seeded areas shall be left with a firm surface free of large stones over 1-inch in any dimension and other foreign material that would interfere in the seeding operation. Discarded stones and debris shall be removed from the site or, at the sole discretion of the Engineer, may be collected and redistributed on the finished grade at designated locations.

Prior to seeding, the soil surface shall be loose but not wet. Seeding shall be done immediately following the final preparation of each seedbed area, which may involve preparation, mobilization, and seeding of distinct portions of the site separately as agreed to by the Engineer. The intent is that no measurable rainfall shall have occurred on these areas between the ground preparation and the seeding operations. If the ground surface becomes encrusted prior to placing native seeds, the Contractor will be required to loosen the surface until acceptable. Hoses may be used to seed project areas where heavy equipment cannot access. Scheduling of seeding mobilization will be coordinated with the Engineer at the construction meetings, or more frequently as requested. The Contractor shall demonstrate prior to starting the seed installation his proposed method for the seedbed preparation, recognizing the site conditions and these specification requirements, and make modifications during the course of the work as directed by the Engineer. The Engineer shall approve the seedbed preparation and establish the acceptable preparation methods for the project.

Obtain approval of the seedbed preparation areas prior to seed application. Apply slurry in a sweeping motion to form a unified mat of specified materials. Use the hydromulch material as a guide in applying the slurry. Do not cause rivulets, erosion, or changes to the finished grade. Wash, clean or remove overspray as directed by the Engineer.

The slurry for the hydroseed process shall be as follows:

SLURRY MIX	**RATE**
Commercial Fertilizer: (16-20-0 analysis) or approved equal	300 lbs./acre
Hydromulch: 100% wood fiber or equivalent	2,000 lbs./acre
Tackifier	150 lbs./acre
Seed mix:	As specified

The seed shall not be combined with the slurry mix for more than 30 minutes prior to use.

The Engineer may observe the weighing of seed, mixing of slurry mixes, and application of seed. The Contractor shall coordinate with the Engineer in advance so these operations can be observed on a regular basis.

The Contractor shall submit a batch (tank) mix for the Engineer's approval prior to mixing any seed/mulch slurry. Batch mixing and coverage will be monitored throughout seeding operations. The slurry shall be anchored by tackifier incorporated into the slurry at the rates specified above.

Any material sprayed on non-designated areas shall be immediately removed at the Contractor’s expense. Non-designated areas may include, but are not limited to, Do Not Disturb areas, structures, walls, fences, pavement, roads, trails/paths, signs, trees, plants, site furnishings, and equipment.

Cleanup and Protection: During native seeding work, keep work areas clean and in an orderly condition. Broom, scrub, or hose affected areas as directed by Engineer to maintain a clean and neat work area.

Promptly remove soil and debris created by seeding work from paved areas. Clean wheels of vehicles prior to leaving site to avoid tracking soil onto surfacing of roads, walks or other paved areas.

Treat, repair, or replace damaged work during the installation as directed by the Engineer, at no cost to the project. Remove all debris, trash, and excess materials generated by the seeding installation.

430.8 DECOMPOSED GRANITE AREA:

Decomposed granite shall be in accordance with Section 795. The Contractor shall confirm that a sufficient quantity is available so that the entire area will be of the same composition and appearance and shall furnish a sample to the Engineer for approval as to color.

The Contractor shall stake out all areas to receive granite. These areas shall be graded, compacted, and herbicide treated according to these specifications and the special provisions. Rocks larger than 1/2" in diameter, within the top 1" of subgrade soil, shall be removed and properly disposed of. Prepare the ground surface immediately before applying herbicide treatment.

After preliminary grading is completed and the area has been cleared and grubbed, the decomposed granite shall be evenly distributed over the area with a minimum depth of 2 inches. Finish grading will be accomplished and a pre-emergent shall be applied over the entire area, in accordance with the manufacturer's recommendations.

All herbicide applications shall be performed by a professional who is certified by Arizona Department of Agriculture's Pest Management Division in the appropriate categories which apply. All applications of herbicides shall be documented accordingly and submitted to the Engineer.

A second treatment with the pre-emergence control will be accomplished within 30 days in accordance with the manufacturer's recommendations.

430.9 DESERT PAVEMENT:

At the pre-construction conference, the Contractor shall submit to the Engineer a Desert Pavement Plan (Plan). The Plan shall include, but shall not be limited to, a detailed identification and explanation of earthwork operations from clearing and grubbing through finished surface installation, including coordination of the desert pavement salvage, stockpiling of desert pavement, spreading the material, and equipment to be utilized. Prior to starting the earthwork, the Contractor shall demonstrate his/her proposed procedures for placing the salvaged desert pavement, applying the seedbed amendments (if applicable), and preparing the seedbed for seeding as required in this specification. Several techniques (individually or in combination) may be required to achieve the desired finished construction.

A 1,000 square-foot (minimum) section of project area shall be used to demonstrate how the Contractor intends to satisfy this specification. During the demonstration, the Engineer may request the use of alternative techniques for evaluation. After review of the demonstration activities, the Engineer will then either approve the proposed methods or direct the use of alternative methods that he/she is of the opinion will successfully achieve the intended results. Earthwork activities shall not commence until the Engineer has approved the methods to be used. Adjust the procedures as directed. The approved method(s) shall be used on all surface areas, as applicable, exclusive of where rock outcrops may remain in the finished surface. The Plan shall be updated to incorporate the changed procedures and re-submitted upon completion of the demonstration activities.

The Contractor shall salvage and collect the top 2-4 inches of existing surface soil and rock within the work limits which will be spread over the disturbance area prior to seeding activities. The salvaged material shall contain minimal amounts of cobble, aggregate, caliche, undesirable rock particles or other deleterious materials that are inconsistent with the intended appearance and use as described in this specification. Excessive amounts of such undesirable materials shall be removed from the desert pavement at the direction of the ENGINEER. Particle sizes of the in-situ desert pavement shall be acceptable, except that no material particle greater than six inches in any dimension shall be evident in the finished surface of the distribution area. To preserve the biological elements within the in-situ desert pavement, the salvaged material shall be stockpiled no higher than 6 feet.

Vegetative matter allowed to remain in the finished desert pavement installation may include leaves, twigs (less than 1" diameter), roots, small branches (less than 1 foot in length), tree bark, and other minor levels of debris generated during the clearing and grubbing operations, provided that the cumulative appearance of these components on the ground surface are not a visual contrast with the pre-construction condition or the surrounding undisturbed landscape and do not interfere with the seeding and planting operations. Stumps shall be removed

If an insufficient quantity of desert pavement is salvaged for the final construction, the Contractor may elect to cull, sort, select, crush, and/or stain soil or rock particles that are excavated from the project area to create an acceptable equivalent to the use of natural desert pavement as described herein. If materials are culled from the excavation, the observable particle sizes, color, texture, and composition mix of rock and soils shall be visually indistinguishable from equivalent to the natural desert pavement from a distance 30 feet, at the sole discretion and determination of the Engineer.

When the desert pavement work is complete, the finished ground surface of the pavement areas shall appear nearly identical to the pre-construction condition or the undisturbed ground surface in the adjacent, undisturbed lands, particularly related to in regards of rock types, soils textures, and particle size and gradation, rock size distribution and patterns, and color, as well as the size and gradation of surface strewn rocks and rock type. Individual rocks larger than 4 inches in any dimension and allowed by the Engineer, that, during placement, come to rest with their unoxidized surface(s) exposed shall be overturned or repositioned by hand so that the oxidized surface(s) are visible on the ground surface when the work is complete.

430.10 HEADER INSTALLATION:

Headers shall be installed at the location and grades as shown on the plans. The header shall vary no more than ¼ inch in each 10 feet from the vertical or horizontal dimension and the identified grades, elevations, and cross sections shown on the plans. Prior to installation, stake the alignment and elevations for the Engineer's approval. Concrete forms shall be approved by the Engineer prior to use. Make minor adjustments as requested.

430.11 CLEAN UP:

Any debris, paint, stains, marks, glues, or other deleterious materials dropped or splashed onto paved or graded areas, walls, and plantings during landscaping operation, which is not intended to remain in the final construction, shall be promptly removed and these areas shall be kept neat and clean at all times. Upon completion of landscaping, all remaining soil, stones, and other debris shall be removed from the site and disposed of to the satisfaction of the Engineer.

430.12 MAINTENANCE:

430.11.1 Landscaping: After planting, the landscape areas shall be maintained on a continuous basis as they are completed in accordance with this specification and the special provisions until the end of the Plant Establishment Period or the acceptance of the project by the Contracting Agency, whichever occurs later. Plants shall be kept in a healthy growing condition by watering, pruning, spraying, weeding, and any other necessary operation of maintenance. Planting area shall be kept free of weeds, grass and other undesirable vegetation. Maintenance shall include control of noxious and undesirable weeds and vegetation or pest infestations that would jeopardize the growth of planted materials, fertilization as needed, and cultivating the planting areas. Remove dead, damaged defective, or underperforming plants within seven days of notification. Replacements shall be of the same kind and size as originally specified and shall be installed as shown on the plans, as described in this specification, and the special provisions and shall be completed at no additional cost to the project.

Pruning and staking of trees, shrubs, and ground cover and the removal or re-staking of trees shall be directed by the Engineer and includes removal of any growth conflicting with vehicular or pedestrian movement. Irrigation watering period durations and intervals should be adjusted for seasonal plant needs. After the first growing season move any tree drip irrigation within two (2) feet of the root flare to at least three to four (3-4) feet from the root flare. At no additional cost to the project, add additional drip irrigation materials as required to relocate the drip irrigation distribution points.

430.12.2 Lawns: Begin lawn maintenance after the areas are planted and continue until turf is established and accepted. Maintain turf by watering, weeding, mowing, trimming, and other operations such as rolling, regrading, rock picking, repair of all erosion, fertilizing and replanting as required to establish a smooth, even, acceptable turf, free of subsidence, and eroded or bare areas. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the specified grass height. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible.

430.12.3 Native Seeding: The Contractor shall monitor the site and conduct maintenance activities as necessary to meet the project requirements. The Contractor shall restore mulching materials that have eroded or have otherwise been displaced. Reseeding shall be undertaken if the seedbed has been deteriorated or if, in the opinion of the Engineer, the seeded areas are no longer viable for establishing the planted seeds. Erosion shall be repaired, reseeded, and re-mulched with material as specified herein.

From initiation of the seeding operation through final acceptance, the contractor shall monitor the site for weeds and treat as needed. Weed infestations shall be removed and/or treated during the establishment period to reduce competition and allow seeded species to become established. The Engineer shall approve the chemical treatments for weed control prior to use on the project. If the Engineer determines that weed competition is detrimental to the establishment of the seeded areas, the Contractor will be directed to remove or treat the weeds, re-till if needed, reseed and re-mulch the affected areas. In no case will weeds be allowed to grow at competitive densities. In all cases, removal or treatment of weeds shall be done prior to their seed formation. If the optimal planting period for native seeding has passed without compliance with the acceptance criteria, the Contractor shall be responsible for replanting, weeding, maintaining the seeding and taking remedial actions as required to complete the deficient work during the following growing season, or until accepted by the Engineer. The Engineer shall be the sole judge of the remedial actions to be taken by the Contractor. **430.13 PLANT ESTABLISHMENT PERIOD:**

430.13.1 Landscaping: The plant establishment period shall be for a minimum period of ninety (90) days after final acceptance of the project by the Contracting Agency. The Contractor shall request a walk-through inspection by the Engineer whenever completion of the planting and related work has been accomplished. After this inspection, and subject to approval of the work, the Engineer will issue a written field notification to the Contractor setting the effective, beginning date for the landscaping Plant Establishment Period.

At the time of walk-through inspection (Substantial Completion), all planting areas under this contract shall be maintained equally, free of weeds, and neatly cultivated. All plants shall be alive and healthy, regardless of origin or source, without signs of stress or deleterious conditions. Granite shall be free of rills, rivulets, or erosion. During the plant establishment period, the landscape areas shall be inspected by the Engineer at least once every two weeks, which the Contractor is expected to participate in, to review the work and to identify corrections to the work.

If the landscape areas are improperly maintained during the Plant Establishment Period, appreciable plant replacement is required, or other corrective work becomes necessary to meet the specified requirements, the Engineer may extend the plant establishment period on a monthly basis until the work is accepted, at no additional cost to the project. At the end of the plant establishment period, a final acceptance inspection of the planted areas will be made by the Engineer. If at the final acceptance inspection, the landscaping work satisfies project requirements, the Engineer will issue a written notification terminating the Contractor's plant establishment period responsibilities.

430.13.2 Lawns: Lawns will be acceptable at the end of the Plant Establishment Period if a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 square foot area. and no individual bare spots not exceeding 3 by 3 inches. At no additional cost to the project, work not meeting this specification, including maintenance, shall be continued until the grass installation is accepted.

430.13.3 Native Seeding: The Native Seeding Establishment Period shall be forty five (45) calendar days beyond the seeding Substantial Completion inspection. All seeded areas shall be inspected for acceptance after the seeding work has been completed. At the time of the inspection, 100% of the seed and stabilizing mulch shall be in place, and there shall be no evidence of rilling, erosion, or damage within the seeded areas. Areas not conforming to this work item shall have the deficiencies corrected before initiating the Native Seeding Establishment Period.

If the native seeding areas are improperly maintained, if appreciable reseeding is required (for whatever reason), or if other corrective work is necessary, the seeding establishment period will be extended at the sole discretion of the Engineer, and the Contractor shall continue to maintain the seeding until accepted at no increased cost to the project

At the completion of the Native Seeding Establishment Period, to determine final acceptance of the native seeding, a final inspection will be conducted and any areas that have less than 90% of applied seed and mulch in place, shall be reseeded, re-mulched, and re-tacked at no additional cost to the project. At the Engineer's discretion, the 45-day Native Seeding Establishment Period may be extended an additional 30 days beyond the final inspection date; the contractor shall maintain the seeded areas through the extension period. Acceptance of the native seeding and desert pavement at the final inspection will conclude the Contractor's responsibilities for these elements of the project.

430.14 PLANT WARRANTY AND GUARANTEE

At no additional cost to the project, warranty all installed plant material for a period of one (1) year after final acceptance of the project against defects including death and unsatisfactory growth, except for defects resulting from neglect by the Owner, vandalism, abuse or damage by others, or unusual phenomena or incidents which are beyond the Contractor's control. Remove and replace plant material found to be dead or in unhealthy condition at any time during the warranty period or as directed by the Engineer. Replace plant material that is in doubtful condition at the end of warranty period, unless, in the opinion of Engineer, it is advisable to delay replacement. If a replacement is delayed, another inspection will be conducted, at an agreed-upon date, to determine acceptance or rejection. Only one replacement (per tree, shrub, or cacti) will be required during the warranty period, except for loss or replacements due to failure to comply with the specified requirements.

430.15 MEASUREMENT AND PAYMENT:

Measurement and payment shall be in accordance with Section 109.

The lump sum or unit prices established on the proposal sheet shall be full compensation for furnishing all labor, equipment, materials, and incidentals for performing the work necessary to complete the landscaping installation complete in place, as shown on the plans and described in this specification unless superseded by the special provisions.

When the proposal sheet does not include a separate line item for the Plant Establishment Period, the cost shall be assumed to be included in the schedule of values for the landscape items (e.g., plant salvage, trees, shrubs, lawns, inert materials, irrigation, etc.). Ten (10) percent of the bid prices of each line item or the total sum of the landscape items, in addition to retention, will be held for distribution during the Plant Establishment Period. Equal monthly payments will be authorized, based on the findings of the inspections and subject to any extensions, where the Contractor fails to comply with the requirements of this specification. Payment for plant establishment may or may not be supplemental to the final project payment.

- End of Section -